

EPSON[®]

EQUITY[™] LT[™] -286e

**System Diagnostics
User's Guide**

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Introduction

This booklet describes how to use the diagnostics program, called DIAG, to test the condition of your computer's main unit and peripheral devices. The DIAG program provides tests to check the following hardware:

- System board
- Memory
- Hard disk drive
- Diskette drive
- Keyboard
- Video adapter board and monitor
- Printer and communications ports

After you start the diagnostics program, you can create a database that records the location of faulty memory chips, if any exist. This database displays a graphic representing your computer's memory board and identifies the faulty chips.

Once you select a test, you need to specify how long to run it. You use the Run Time Parameters window to specify a certain length of time to run the test, run it continuously until you interrupt it, or specify a number of times to run the test.

Starting the Diagnostics Program

To start the diagnostics program, follow these steps:

1. Insert the Diagnostics diskette in drive A.
2. Turn on or reset the computer.
3. At the MS-DOS@ prompt, type the following and press Enter:

```
DIAG
```

The Diagnostics program displays a title screen.

4. Press any key to continue.

Creating a Database

You can create a database to record the location of faulty memory chips that are causing memory errors. To graphically represent the memory board on the screen, you need to identify your system's memory configuration.

In the lower portion of the screen, you see this message:

```
Press <Esc> to bypass database creation
```

Press ESC if you do not want to create the database. The DIAG main menu appears so you can select the tests you want to run.

If you want to create a database, follow these steps:

1. Type the name (from 1 to 50 characters) that identifies your company or the computer and press **Enter** in response to this prompt:

```
vendor's name :  
(maximum 50 characters)
```

For example, type EPSON and press **Enter**.

2. Type the computer's model number (from 1 to 8 characters) and press **Enter** in response to this prompt:

```
model number      :  
(maximum 8 characters)
```

For example, type LT-286e and press **Enter**.

DIAG stores this information in a file called DIAGS.CNF.

3. If a database with this vendor name and model number does not exist, you see this message:

```
Database does not exist - press  
any key except <Esc> to continue
```

To create the database, press any key other than **ESC**. Now you respond to the screen prompts to update the configuration. You can accept the default values that **DIAG** presents by pressing **Enter**. When you see the diagram of the motherboard, press **ESC** to continue the diagnostics.

If a database with the specified vendor name and model number exists, you see this message:

```
Your database already exists -  
want to update (Y/N)? N
```


To update the existing database, press Y and Enter. Now you respond to the screen prompts to update the configuration.

If you do not want to update the database, press N and Enter. You see the DIAG main menu.

The DIAG Main Menu Screen

The DIAG main menu screen looks like this:

```
System Board  Memory  Hard Disk          Keyboard  Video  Misc1.

Basic Functionality test
CPU Protected Mode Test
Processor speed test

CoProcessor test
DMA Controller test
Interrupt Controller test
Timer test
Real Time Clock test
CMOS Validity test

Run Time Parameters:
Testing Mode : (T)imebound / (C)ontinuous / (P)assbound [max=65535] ? P
Wait On Error (Y/N)? Y Error Logging (Y/N)? No. Of Passes: 00001

Prev/Next Window Prev/Next Test Run Highlighted Test<ENTER> Exit<ESC>
Set Params<F2> Sel/Deasel Test<F3> Sel ALL<F4> Deasel ALL<F5> Run Sel Tests<F6>

Tests Basic Operation of CPU in Real Mode
```

The program's title, copyright information, and the date and time appear at the top of the screen.

The DIAG options line shows these categories of tests: System Board, Memory, Hard Disk, Floppy, Keyboard, Video, and Miscellaneous.

After you select a category, DIAG provides a submenu of the available diagnostics tests. When the main menu first displays, you see the submenu of diagnostics tests for the System Board category.

The Run Time Parameters window lets you specify how long you want the test to run, whether you want DIAG to notify you of each error as it occurs, and whether to create a log of all errors that occur during testing.

The Help window shows the keys you use to make menu selections.

A short message describing each test you highlight displays at the bottom of the screen.

You use these keys to make menu selections and run diagnostics tests:

Key	Function
→	Move to the next window (or device)
←	Move to the previous window (or device)
↓	Move to the next test
↑	Move to the previous test
Enter	Start the test
F2	Set the Run Time Parameters
F3	Select or deselect a test
F4	Select all tests
F5	Deselect all tests
F6	Run all selected tests

Selecting Diagnostics Tests

This section describes the various ways you can select the tests you want to run.

To start a single test, move the cursor to highlight the test category on the main menu. Then move the cursor to the submenu and highlight the test you want to perform. Press **Enter** to start the test.

To select several tests at one time, move the cursor to each test you want to perform and press F3. If you decide you do not want to run a selected test, highlight the test name and press F3 again.

You can press F4 to select all tests for all devices, and press F5 to deselect all selected tests.

Once you select a test, it remains selected until you deselect it. If you run a test or a group of tests and start testing again, DIAG performs the same tests unless you deselect them.

You must enter certain parameters for the hard disk drive and the diskette drive tests. If you use F3 to select these tests, DIAG prompts you for the information. If you use F4 to select these tests, DIAG prompts you for the information during the first pass of the test. If you perform more than one pass of the test, DIAG uses the same parameters for each pass.

You cannot include certain tests in a group. The tests that must run separately include:

category	Test
System Board	Timer test Real Time Clock test
Hard Disk	Hard Disk Format Auto Interleave Media Analysis Force Bad Tracks
Floppy	Disk Change Line Test
Keyboard	Scan/ASCII Code Test
Miscellaneous	Printer Adapter Test: Comm. Adapter Test

After you select the test(s) you want to run, you must set the Run Time Parameters.

Setting the Run Time Parameters

To specify the Run Time Parameters, press F2 to move to the Run Time Parameters window. DIAG displays default values for each of the run time parameters.

You can press ESC at any time to exit the Run Time Parameters window and return to the submenu of diagnostics tests.

The first: run time parameter defines how long or how many times to run the test. You see this prompt:

```
Testing Mode: (T)imebound / (C)ontinuous /  
(P)assbound [max = 65535] (T/C/P) ? P
```

Type **T** and press **Enter** to run the selected tests in Timebound mode. In Timebound mode, DIAG runs the tests for the amount of time you specify.

Type **C** and press **Enter** to run the selected tests in Continuous mode. In Continuous mode, the tests run until you interrupt them.

Type **P** and press **Enter** to run the diagnostics tests in Passbound mode. In Passbound mode, DIAG executes the selected tests the number of times you specify. This is the default setting.

The next prompt is:

```
Wait on error ( Y / N ) ? Y
```

Press **Y** and **Enter** if you want DIAG to pause when an error occurs during a test. DIAG pauses and waits for you to press **Enter** before continuing. This lets you view the error message and make notes about the error. This is the default setting.

Press **N** and **Enter** if you want DIAG to continue when an error occurs.

The next prompt is:

```
Error logging ( Y / N ) ? N
```

Press **Y** and **Enter** to record the errors that may occur during the test. See the “Error Logging” subsection for details.

Press **N** and **Enter** if you do not want to create the log. This is the default setting.

If you decide not to wait on errors, you should select error logging so you can review the errors that occur during the tests.

Next, DIAG requests information it needs to perform the type of testing you selected.

Timebound Testing

If you selected Timebound testing, you see this prompt:

```
Period :001 hr 00 min
```

Specify the amount of time you want to run the selected test(s). Type the number of hours, from 000 to 999, and press **Enter**. Then type the number of minutes, from 00 to 59, and press **Enter**. You can use the backspace key (←) to edit your input.

Continuous Testing

If you selected Continuous testing, DIAG needs no additional information. After you specify whether to create the error log, DIAG returns to the main menu. You see this message in the Run Time Parameters window:

```
Test Mode: Continuous
```

Passbound Testing

If you selected Passbound testing, you see this prompt:

```
No. of Passes : 00001
```

Specify the number of times (from 1 to 65535) you want DIAG to run the test(s). Or press **Enter** without entering a number to select the default of one pass. You can use the backspace key to edit your input.

Running a test multiple times provides reliability testing of essential functions only. In most cases, running a test once is sufficient.

If you specify a number larger than 65535, DIAG subtracts 65535 from your entry to determine how many times to run the test. For example, if you enter a value of 65540, DIAG runs the test(s) five times.

Error Logging

When you request error logging, DIAG displays the following pop-up window:

```
Log errors on disk
Log errors to printer (LPT1)
Log errors to serial port (COM1)
Cancel error logging
```

Highlight the device you want to use to store or print the error messages. Press **Enter** to select the device, or press **ESC** to exit the pop-up window and return to the Error logging prompt.

If you select **Log errors on disk**, DIAG displays another pop-up window:

```
Floppy disk A:
Floppy disk B:
Hard disk C:
```

Highlight the disk where you want to store the error messages. Press **Enter** to select the specified disk drive.

DIAG creates a file called ERROR.LOG in the current directory of the specified disk drive. After running the tests, you can open the ERROR.LOG file to review the errors that occurred during the tests.

After selecting error logging, DIAG uses this device (and/or disk drive) for error logging until you indicate you do not want error logging. You can then specify a new device and/or disk drive by selecting error logging in the Run Time Parameters window. When you specify a new device and/or disk drive, DIAG erases the existing ERROR.LOG file.

If you select the printer, DIAG writes the error messages to the device connected to your parallel port assigned LPT1. If you select the serial port, DIAG writes the error messages to the device connected to your serial port assigned COM1.

If you select Cancel error logging, DIAG changes the error logging response from Y to N.

When you specify the device for error logging, one of the error messages may appear:

```
Floppy disk A not present  
Floppy disk B not present  
Hard disk C not present  
Printer port not present  
Serial port not present  
Error in printer status  
Error in serial port status  
Error in floppy drive A
```

Record the error message and select a different device for error logging.

Executing Diagnostics Tests in Batch Mode

To execute the selected group of diagnostics tests in batch mode, simply press F6.

DIAG highlights each test name as it runs the test.

If you selected Passbound testing, DIAG displays the pass number on the right side of the screen above the Run Time Parameters window. For example:

```
Pass : 00001
```

When DIAG is executing a group of tests, you can stop the testing and return to the System Board submenu of tests by pressing **Ctrl Break**. DIAG completes the current test before it stops.

If you specified `Wait on error` in the Run Time Parameters, DIAG pauses each time an error occurs. When you press **Enter**, DIAG continues the diagnostics testing.

Running the Tests

When DIAG completes a test, you see this prompt:

```
Press <ENTER> to return to MAIN MENU.
```

Press **Enter** to return to the main menu.

If an error occurs during a test, note the error message and contact your Epson dealer. Your dealer may be able to solve the problem; if not, he or she can refer you to an authorized Epson Customer Care Center. If necessary, call the Epson Consumer Information number (1-800-922-891 1) for the location of your nearest authorized Epson Customer Care Center.

System Board Diagnostics

The tests listed in the System Board submenu provide a complete diagnostics check of the system board.

Basic Functionality test CPU Protected Mode test Processor speed test

CoProcessor test DMA Controller test Interrupt Controller test Timer test Real Time Clock test CMOS Validity test
--

Basic Functionality Test

This test verifies the operation of each major component on the system board. It checks the instructions, registers, and flags of the CPU.

When the test completes successfully, you see this message:

```
Basic functionality test of CPU passed OK.
```

CPU Protected Mode Test

This test switches to protected mode and checks the protected mode instructions, such as LSL, VER, and LAR.

When the test completes successfully, you see this message:

```
Protected mode test of CPU passed OK.
```

Processor Speed Test

This test identifies the CPU clock speed and displays a message similar to this:

```
Measure CPU speed in Megahertz = 12.00
```

Coprocessor Test

This test checks the math coprocessor.

If the math coprocessor is not installed, you see this message:

```
Numeric Data processor not present.
```

DMA Controller Test

This test performs read/write tests on the memory address registers and page registers of DMA controller 1 and 2.

During the test, you see this message:

```
Testing Programmable DMA Controller.
```

When the test completes successfully, you see this message:

```
Programmable DMA Controller test  
passed OK.
```

Interrupt Controller Test

This test performs read/write tests on the interrupt mask registers and checks for invalid interrupts.

During the test, you see this message:

```
Testing Programmable Interrupt  
Controller . . . .
```

When the test completes successfully, you see this message:

```
Programmable Interrupt Controller test  
passed OK.
```

Timer Test

This test verifies the accuracy of the timer count by comparing it to the periodic interrupt of the system's real time clock (RTC).

During the test, you see this message:

```
Testing Programmable Interval Timer.
```

When the test completes successfully, you see this message:

```
Programmable Interval Timer test  
passed OK.
```

RTC Test

This test verifies the accuracy of the real time clock by comparing it to the timer 0 interrupt.

During the test, you see this message:

```
Testing Real Time Clock....
```

When the test completes successfully, you see this message:

```
Real Time Clock test passed.
```

CMOS Validity Test

This test checks the system's CMOS RAM.

During the test, you see this message:

```
Testing CMOS validity....
```

When the test completes successfully, you see this message:

```
CMOS validity test passed OK.
```

Memory Diagnostics

The tests listed in the Memory submenu provide a complete diagnostics check of the system's built-in memory.

BIOS ROM Test
Parity test Pattern test Walking 1's test Walking 0's test Address test Refresh test

If you have relocated any memory addresses, you must change the addresses to their original locations for the memory tests to work properly.

If an error occurs during a memory test, DIAG displays this message:

PRESS <ENTER> TO VIEW FAULTY MEMORY CHIP.

To view the faulty memory chip, you must have created a database. If not, you see this message:

<database not created>

If you have created a database, DIAG displays the diagram of the motherboard and highlights the faulty memory chip.

BIOS ROM Test

This test checks the data path of the BIOS ROM.

When the test completes successfully, you see this message:

```
System ROM module test passed.
```

Parity Test

This test checks for parity errors in memory.

During the test, DIAG displays these messages:

```
Testing from absolute memory location  
xxxxxxxxxh.
```

```
Checking for parity error.
```

When the parity test completes without an error, you see this message:

```
Parity test passed OK.
```

Pattern Test

This test performs a read/write test of memory and identifies any memory faults.

During the test, you see these messages:

```
Testing from absolute base xxxxxxxxh  
Performing Pattern test in memory.
```

When the test completes successfully, you see this message:

```
Pattern test in memory passed OK.
```

Walking 1's Test

This test checks the voltage in the data lines for any shorts and checks for any data bits that are always 1.

During the test, you see this message:

```
Testing from absolute base xxxxxxxxh
```

When the test completes successfully, you see this message:

```
Walking 1s test in memory passed OK.
```

Walking 0's Test

This test checks the voltage in the data lines for any shorts and checks for any data bits that are always 0.

During the test, you see these messages:

```
Testing from absolute base xxxxxxxxh
```

When the test completes successfully, you see this message:

```
Walking 0s test in memory passed OK.
```

Address Test

This test checks for any shorts in the address line.

When the test completes successfully, you see this message:

```
Exclusivity test of address lines  
passed.
```


Refresh Test

This test checks the refresh interval.

If an error occurs, DIAG displays this message:

```
Failure in Refresh test.
```

When the test completes successfully, you see this message:

```
Refresh test passed OK.
```

Hard Disk Diagnostics

The tests listed in the Hard Disk submenu provide a complete diagnostics check of the system's hard disk drive.

Hard Disk Format Auto Interleave
Media Analysis
Perform Test Seek Test Read/Verify Test Check Test Cyl.
Force Bad Tracks

Hard disk diagnostics tests may be destructive or non-destructive. Destructive diagnostics destroy data on the hard disk. Non-destructive diagnostics do not destroy data on the hard disk.

Destructive diagnostics tests include:

- Hard Disk Format
- Auto Interleave
- Media Analysis
- Force Bad Tracks

The non-destructive diagnostics tests include:

- Performance Test
- Seek Test
- Read/Verify Test
- Check Test Cylinder

Hard Disk Parameters

DIAG may request any or all of the following parameters before performing a following hard disk test:

- Disk drive identifier
- Disk drive type
- Interleave factor
- Bad track list
- Start cylinder number
- End cylinder number
- Start head number
- End head number

Disk drive identifier

DIAG displays the following prompt for the disk drive identifier:

```
Disk Drive (C/D)      ? c
```

If only one hard disk is connected to the computer, DIAG assumes it is drive C and does not request a response to this prompt.

Disk drive type

DIAG displays the following prompt for the disk drive type:

```
Disk Drive type      ?  2
```

Select drive type 2 for a 20MB drive or drive type 17 for a 40MB drive. DIAG determines the type of hard disk drive based on the settings in CMOS RAM.

A pop-up window on the screen lists 47 possible drive types. This allows for the possibility of additional hard disk drives in the future. If you select the User Defined hard disk drive, you must provide the following information:

- Number of cylinders
- Number of heads
- Number of sectors per track
- Write precom
- Write precom cylinder number
- Landing zone

Interleave factor

DIAG displays the following prompt for the interleave factor:

```
Interleave (1-16)    ?
```

The interleave factor affects the performance of your hard disk. The default value is 3.

When you execute the Auto Interleave test, DIAG determines the best interleave value for your hard disk and formats the hard disk for this interleave factor.

If you enter an interleave value in response to the Interleave prompt, you override the value set by DIAG. Only do this if the documentation with your hard disk recommends a different value.

Bad track list

DIAG displays the following prompt for the bad track list:

```
Mark Bad Tracks (Y/N) ?
```

Entering the bad track list is optional. If you respond Y to the above prompt, you see the following menu in a pop-up window:

```
Add an entry  
Revise an entry  
Delete an entry  
Clear Bad Track list  
Save and Exit
```

You do not need to enter a bad track list for the hard disk that comes with the Equity LT-286e.

When you execute the Media Analysis test, DIAG automatically marks the bad tracks when it formats the hard disk.

Start and end cylinder numbers

DIAG displays the following prompts for the starting and ending cylinder numbers:

```
Start cylinder number ?  
End cylinder number   ?
```

Enter the first and last cylinder numbers on which you want to perform the tests. The default for the start cylinder number is 0, and the default for the end cylinder number is one less than the highest cylinder number of your hard disk. For a 20MB hard disk drive, the highest cylinder number is 614. For a 40MB hard disk drive, the highest cylinder number is 976.

Start and end head numbers

DIAG displays the following prompts for the starting and ending head numbers:

```
Start Head number      ?  
End Head number       ?
```

Enter the first and last head numbers on which you want to perform the tests. The default for the start head number is 0, and the default for the end head number is one less than the highest head number of your hard disk. The highest head number for the Equity LT-286e is 3.

After you specify the hard disk parameters required for the selected diagnostics test, DIAG begins executing the test.

Hard Disk Format

Use this test when installing a new hard disk in your computer. It preformats your hard disk on the hardware level. (You must still format the hard disk for your operating system.)

Note

This destructive diagnostics test destroys any data on your hard disk.

You may need to reformat a hard disk if you have a serious problem with the drive. However, before executing this program on a hard disk with data, try every other recovery procedure described in your operating system manual. Then back up all data on the hard disk before you start the DIAG program.

The Hard Disk Format program lets you format the entire hard disk or any portion of it.

When you select Hard Disk Format, DIAG requests the following hard disk parameters:

- Disk drive identifier
- Disk drive type
- Interleave factor
- Bad track list (optional)
- Start cylinder number
- End cylinder number
- Start head number
- End head number

If you do not specify the bad track list, DIAG performs an analysis of the surface of the hard disk to determine the bad tracks.

DIAG displays the following messages after you specify the hard disk parameters:

```
                W A R N I N G
All data on Hard disk you have
specified may be LOST...
DO YOU STILL WANT TO CONTINUE (Y/N)?
```

Press **Y** and **Enter** to start formatting the hard disk. Press **N** and **Enter** to stop the operation.

Auto Interleave

This test lets DIAG determine the interleave factor for your hard disk.

Note
This destructive diagnostics test destroys any data on your hard disk.

When you select Auto Interleave, DIAG requests the disk drive identifier and disk drive type. After you specify the parameters, you see these messages:

```
W A R N I N G
All data on Hard disk you have
specified may be LOST...
Do you still want to continue (Y/N)?
```

Press **Y** and **Enter** to start the Auto Interleave function. Press **N** and **Enter** to stop the operation.

Media Analysis

This test identifies the bad tracks on the hard disk. DIAG performs a comprehensive analysis of the surface of the hard disk to find the bad tracks. DIAG uses three different bit patterns for this test. It formats the hard disk, marks the bad tracks, and displays the bad track list.

Note

This destructive diagnostics test destroys any data on your hard disk.

When you select Media Analysis, DIAG requests the following hard disk parameters:

- Disk drive identifier
- Disk drive type
- Interleave factor
- Start cylinder number
- End cylinder number
- Start head number
- End head number

DIAG displays the following messages after you specify the hard disk parameters:

W A R N I N G

All data on Hard disk you have
specified may be LOST...

Do you still want to continue (Y/N)?

Press **Y** and **Enter** to start analyzing the hard disk. Press **N** and **Enter** to stop the operation.

Performance Test

This test checks the performance of your hard disk. It determines the data transfer rate and track-to-track seek time based on the transfer rate, seek count, and the amount of data transferred.

The interleave factor is the most critical factor in determining disk performance. Changing the interleave factor can drastically change disk performance.

DIAG measures the data transfer rate in kilobytes per second. To measure the data transfer rate, DIAG reads 64KB of data 15 times and counts the number of timer ticks using this formula:

$$\text{Transfer rate} = (64\text{KB} \times 15 \times 18.2) / \# \text{ timer ticks}$$

DIAG measures track-to-track seek time in milliseconds using this formula:

$$\text{Seek time} = (\# \text{ timer ticks} \times 1000) / 18.2 \times 200$$

The number of seeks is 200.

A higher data transfer rate and a lower seek time indicate better disk performance.

When you select the Performance Test, DIAG requests the disk drive identifier and disk drive type.

Seek Test

This test checks the seek capability of the hard disk on the specified range of cylinders and heads. DIAG performs a series of sequential seeks followed by random seeks. It reports any errors found.

When you select Seek Test, DIAG requests the following hard disk parameters:

- Disk drive identifier
- Disk drive type
- Start cylinder number
- End cylinder number
- Start head number
- End head number

Read/Verify Test

This test checks the read and verify capability of the hard disk on the specified range of cylinders and heads. DIAG performs both sequential and random read and verify operations. It reports any errors found.

When you select Seek Test, DIAG requests the following hard disk parameters:

- Disk drive identifier
- Disk drive type
- Start cylinder number
- End cylinder number
- Start head number
- End head number

Check Test Cylinder

This test checks the test cylinder, which is the last cylinder on the hard disk.

Perform this test if you receive a hard disk error when you boot the system.

When you select Check Test Cylinder, DIAG requests the disk drive identifier and disk drive type.

Force Bad Tracks

Use this test to mark bad tracks on the hard disk without formatting the disk.

Note

This destructive diagnostics test destroys any data on your hard disk.

When you select Force Bad Tracks, DIAG requests the following hard disk parameters:

- Disk drive identifier
- Disk drive type
- Start cylinder number
- End cylinder number
- Start head number
- End head number

DIAG displays the following messages after you specify the hard disk parameters:

W A R N I N G

All data on Hard disk you have
specified may be LOST...

Do you still want to continue (Y/N)?

Press **Y** and **Enter** to start the test. Press **N** and **Enter** to stop the operation.

Hard Disk Error Messages

DIAG displays two types of error messages while testing the hard disk: messages DIAG generates and those the controller generates.

DIAG displays the following message if you attempt to run the Performance Test with less than 128KB of memory:

```
INSUFFICIENT MEMORY FOR DATA TRANSFER  
Minimum memory required is - 128KB
```

The controller displays one of the following messages when an error occurs during a diagnostics procedure:

```
Address mark not found  
Attachment failed to respond  
Bad ECC on disk read  
Bad sector flag detected  
Controller has failed  
Drive activity failed  
ECC corrected data error  
Requested sector not found  
Reset failed  
Seek operation failed  
Write fault on selected drive
```

When you see one of these error messages, check the drive, controller, cables, and power connectors. Remove and re-install the hard disk cartridge. If you still get an error, contact your dealer.

Floppy Disk Diagnostics

The tests listed in the Floppy Disk submenu provide a complete diagnostics check of the system's diskette drive.

```
-----  
Diskette Format |  
-----  
Drive Speed Test  
Random R/W Test  
Sequential R/W Test  
-----  
Disk Change Line Test  
-----
```

Floppy disk diagnostics tests may be destructive or non-destructive. Destructive diagnostics destroy data on the diskette. These tests include:

- Diskette Format
- Random R/W Test
- Sequential R/W Test

Non-destructive diagnostics do not destroy data on the diskette. These tests include:

- Drive Speed Test
- Disk Change Line Test

DIAG requests the following parameter before performing a floppy disk test:

Floppy Disk Drive (A/B) ?

Diskette Format

This test checks the format of the floppy disk controller and drive. It does not format the diskette for any particular operating system.

This test destroys all data on the diskette.

Drive Speed Test

This test verifies how fast the floppy drive rotates a diskette.

Your internal, 1.44MB, 3 1/2-inch diskette drive should rotate the diskette at 300 rpm allowing a tolerance of one percent.

An external, 1.2MB, 5 1/4-inch diskette drive should rotate a 1.2MB diskette at 360 rpm and a 360KB diskette at 300 rpm. Again, allow one percent tolerance.

To perform this test, insert a diskette into the drive you plan to test. Use a diskette you have formatted with the Diskette Format test.

Random R/W Test

This test checks the random seek capability of a floppy disk drive. It performs a random read/write operation on the diskette in the specified drive.

To perform this test, insert a diskette into the drive you plan to test. Use a diskette you have formatted with the Diskette Format test.

This test destroys all data on the diskette.

Sequential R/W Test

This test checks the sequential seek, read, and write capabilities of a floppy disk drive. It performs a sequential read/write operation on the diskette in the specified drive.

To perform this test, insert a diskette into the drive you plan to test. Use a diskette you have formatted with the Diskette Format test.

This test destroys all data on the diskette.

Disk Change Line Test

This test checks the status of the disk change line. This line should change when you insert or remove a diskette from a floppy disk drive.

To perform this test, insert a diskette into the drive you plan to test. Use a diskette you have formatted with the Diskette Format test.

Floppy Disk Error Messages

DIAG displays two types of error messages while testing the floppy disk drive: messages DIAG generates and those the controller generates.

DIAG may display the following error messages during the Disk Change Line test:

Warning - Change line inoperational

DIAG displays this message if the line is not working properly. This may indicate a problem exists with the floppy drive or the controller.

CHANGE LINE Not Available

DIAG displays this message if you attempt to run the Change Line Test on a drive that does not support a change line, such as a 360KB or 720KB drive.

The controller displays one of the following messages when an error occurs during a diagnostics procedure:

BAD address mark
BAD CRC error
BAD DMA error
BAD SEEK error
Diskette WRITE PROTECTED
Media change error
Record not found
TIMEOUT error

These errors could occur because of a faulty drive, controller, or cable, or if you attempt to run a test on a write-protected or unformatted diskette.

Keyboard Diagnostics

The tests listed in the Keyboard submenu provide a complete diagnostics check of the keyboard.

Controller Test
Scan/ASCII Code Test
Keyboard clock line Test
Keyboard data line test

Controller Test

This test checks the keyboard controller.

Scan/ASCII Code Test

This test checks the scan codes assigned to the keys on the keyboard.

When you select this test, DIAG displays the layout of your keyboard on the screen.

When you press a key, DIAG displays the scan code and the ASCII code of the key. See the “Keyboard Scan/ASCII Codes” section later in this booklet for a complete list of the scan codes and ASCII codes for your keyboard.

Press **Ctrl Break** at any time to end this test.

Keyboard Clock Line Test

This test checks the keyboard clock line.

Keyboard Data Line Test

This test checks the keyboard data line.

Video Diagnostics

The tests listed in the Video submenu provide a complete diagnostics check of the video adapter. Use these tests to check the operation of the LCD or monitor connected to your computer.

Run All Tests
Adapter Test
Attribute Test
80x25 Display Test
40x25 Display Test
320x200 Graphics Test
640x200 Graphics Test
Page Selection Test
Color Test
640x350 Graphics Test

Adapter Test

This test checks the memory assigned to the display adapter.

Attribute Test

This test checks the display attributes of the video adapter.

80x25 Display Test

This test checks the 80x25 display feature of the display adapter.

40x25 Display Test

This test checks the 40x25 display feature of the display adapter.

This test is available for a color display adapter only.

320x200 Graphics Test

This test checks the 320x200 graphics display feature of the display adapter.

This test is available for a color display adapter only.

640x200 Graphics Test

This test checks the high resolution (600x200) graphics display feature of the display adapter.

This test is available for a color display adapter only.

Page Selection Test

This test checks the paging function of the display adapter.

This test is available for a color display adapter only.

Color Test

This test checks the background and border color mapping of the display adapter.

This test is available for a color display adapter only.

640x350 Graphics Test

This test checks the 640x350 graphics display feature of the EGA display adapter.

This test is available for a color display adapter only.

Video Error Message

DIAG displays the following error message during the Adapter Test:

```
DISPLAY MEMORY R/W ERROR
```

The Adapter Test detected a read/write error in the display memory. This indicates a problem with the display controller. Contact your dealer.

Miscellaneous Diagnostics

The tests listed in the Miscellaneous submenu provide a complete diagnostics check of the parallel and serial ports.

Printer Adapter Test Commu. Adapter Test

Printer Adapter Test

This test checks the parallel port and the printer by sending a pattern to the printer. If the printer does not print the pattern, the test has failed.

You may see one of the following error messages during this test:

Error - Printer Out of Paper
Error - Printer Not Selected
Error - Printer Interface I/O Error
Error - Time Out On Printer

Check that the printer is on-line, paper is loaded, and all connections are secure.

Communication Adapter Test

This test checks the serial port. Before running this test, you must connect a special RS-232C connector to the serial port. The connector requires the following settings:

RD and TD shorted 2-3

DSR and DTR shorted 4 - 6

CTS and RTS shorted 7 - 8

You can purchase an AT-type loopback connector from most electronic supply stores. This connector allows the test to send out and receive the same data for the purpose of the test.

This test checks the serial port for the following parameters:

9600 baud rate
Odd parity
2 stop bits
8-bit data length

This test first performs a reset function to check for all possible errors. Then it performs a send function followed by a receive.

You may see one of the following error messages during this test:

Error - Break Detected

Error - Framing error

Error - Overrun error

Error - Parity error

Error - Time out!

These error messages indicate a problem with the controller or with the test cable.

Make sure the test connector is secure.

If the error persists, contact your dealer.

Keyboard Scan/ASCII Codes

Keystroke	Scan Code	ASCII Code
Sys Req	**	**
	29	60
Num Lock	**	**
Scroll Lock	**	**
	0C	2D
Home	47	00
↑	48	00
PgUP	49	00
	4A	2D
F1	3B	00
F2	3c	00
F3	3D	00
F4	3E	00
F5	3F	00
F6	40	00
F7	41	00
F8	42	00
F9	43	00
F10	44	00
=	0D	3D
←	4B	00
[blank key]	-	-

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
→	4D	00
+	4E	2B
Esc	01	1B
1	02	31
2	03	32
3	04	33
4	05	34
5	06	35
6	07	36
7	08	37
8	09	38
9	0A	39
0	0B	30
End	4F	00
↓	50	00
PgDn	51	00
← (bksp)	0E	08
Tab	0F	09
q	10	71
w	11	77
e	12	65
r	13	72
t	14	74

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
y	15	79
u	16	75
i	17	69
o	18	6F
p	19	70
[1A	5B
]	1B	5D
Enter	1C	0D
Ctrl	**	**
a	1E	61
s	1F	73
d	20	64
f	21	66
g	22	67
h	23	68
j	24	6A
k	25	6B
l	26	6C
	27	3B
' (apostrophe)	28	27
Shift (left)	• □	**
z	2C	7A
x	2D	78

** No codes
- Ignored

Keystroke	Scan Code	ASCII Code
c	2E	63
v	2F	76
b	30	62
n	31	6E
m	32	6D
, (comma)	33	2C
	34	2E
l	35	2F
Shift (right)	**	**
Alt	**	**
•	37	* *
°	28	5C
[space bar]	39	20
Caps Lock	**	**
Ins	52	00
Del	53	00
Shift SysReq	**	**
Shift ' (-)	29	7E
Shift NumLock	**	**
Shift ScrollLock	**	**
Shift - (-)	0C	5F
Shift Home (7)	47	00
Shift ↑ (8)	48	00

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
Shift PgUp (9)	49	00
Shift -	4A	2D
Shift F1	54	00
Shift F2	55	00
Shift F3	56	00
Shift F4	57	00
Shift F5	58	00
Shift F6	59	00
Shift F7	5A	00
Shift F8	5B	00
Shift F9	5C	00
Shift F10	5D	00
Shift = (+)	0D	2B
Shift ← (4)	48	00
Shift [blank key]	-	-
Shift → (6)	4D	00
Shift +	4E	2B
Shift Esc	01	1B
Shift 1 (!)	02	21
Shift 2 (@)	03	40
Shift 3 (#)	04	23
Shift 4 (\$)	05	24
Shift 5 (%)	06	25

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
Shift 6 (^)	07	5E
Shift 7 (&)	08	26
Shift 8 (*)	09	2A
Shift 9 ((0A	28
Shift 0 ())	0B	29
Shift End (1)	4F	00
Shift ↓ (2)	50	00
Shift PgDn (3)	51	00
Shift ← (bksp)	0E	08
Shift Tab	0F	00
Shift Q	10	51
Shift W	11	57
Shift E	12	45
Shift f?	13	52
Shift T	14	54
Shift Y	15	59
Shift U	16	55
Shift I	17	49
Shift O	18	4F
Shift P	19	50
Shift [(])	1A	7B
Shift] (})	1B	7D
Shift Enter	1C	0D

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
Shift Ctrl		**
Shift A	1E	41
Shift S	1F	53
Shift D	20	44
Shift F	21	46
Shift G	22	47
Shift H	23	48
Shift J	24	4A
Shift K	25	4B
Shift L	26	4C
Shift ; (:)	27	3A
Shift ' ("	28	22
Shift (left)	• □	**
Shift Z	2C	5A
Shift X	2D	58
Shift C	2E	43
Shift V	2F	56
Shift B	30	42
Shift N	31	4E
Shift M	32	4D
Shift, (<)	33	3C
Shift (>)	34	3E
Shift / (?)	35	3F
Shift Shift (right)	**	**

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
Shift Alt	**	**
Shift * (PrtSc)	**	**
Shift \ ()	2B	7C
Shift [space bar]	39	20
Shift CapsLock	**	**
Shift Ins (0)	52	30
Shift Del (.)	53	2E
Ctrl SysReq	**	**
Ctrl	-	-
Ctrl NumLock	-	-
Ctrl ScrollLock (Break) - exits test		
Ctrl -	0C	1F
Ctrl Home	77	00
Ctrl ↑	-	-
Ctrl PgUp	84	00
Ctrl -	-	-
Ctrl F1	5E	00
Ctrl F2	5F	00
Ctrl F3	60	00
Ctrl F4	61	00
Ctrl F5	62	00
Ctrl F6	63	00
Ctrl F7	64	00
Ctrl F8	65	00

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
Ctrl F9	66	00
Ctrl F10	67	00
Ctrl =	-	-
Ctrl ←	73	00
Ctrl [blank key]	-	-
Ctrl →	74	00
Ctrl +	-	-
Ctrl Esc	01	1B
Ctrl 1	-	-
Ctrl 2 (NUL)	03	00
Ctrl 3	-	-
Ctrl 4	-	-
Ctrl 5	-	-
Ctrl 6 (RS)	07	1E
Ctrl 7	-	-
Ctrl 8	-	-
Ctrl 9	-	-
Ctrl 0	-	-
Ctrl End	75	00
Ctrl ↓	-	-
Ctrl PgDn	76	00
Ctrl ← (bksp)	0E	7F

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
Ctrl Tab	-	-
Ctrl Q (DC1)	10	11
Ctrl W (ETB)	11	17
Ctrl E (ENQ)	12	05
Ctrl R (DC2)	13	12
Ctrl T (DC4)	14	14
Ctrl Y (EM)	15	19
Ctrl U (NAK)	16	15
Ctrl I (HT)	17	09
Ctrl O (SI)	18	0F
Ctrl P (DLE)	19	10
Ctrl [(ESC)	1A	1B
Ctrl] (GS)	1B	1D
Ctrl Enter (LF)	1C	0A
Ctrl	**	**
Ctrl A (SOH)	1E	01
Ctrl S (DC3)	1F	13
Ctrl D (EOT)	20	04
Ctrl F (ACK)	21	06
Ctrl G (BEL)	22	07
Ctrl H (bksp)	23	08
Ctrl J (LF)	24	0A
Ctrl K (VT)	25	0B
Ctrl L (FF)	26	0C

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
Ctrl ;	-	-
Ctrl '	-	-
Ctrl Shift (left)	**	..
Ctrl Z (SUB)	2C	1A
Ctrl X (CAN)	2D	18
Ctrl C (ETX)	2E	03
Ctrl V (SYN)	2F	16
Ctrl B (STX)	30	02
Ctrl N (SO)	31	0E
Ctrl M (CR)	32	0D
Ctrl ,	-	-
Ctrl ,	-	-
Ctrl /	-	-
Ctrl Shift (right)	**	**
Ctrl Alt	**	**
Ctrl * (PrtSc)	72	**
Ctrl\ (FS)	2B	1C
Ctrl [space bar]	39	20
Ctrl CapsLock	-	-
Ctrl Ins	-	-
Ctrl Del	-	-
Alt SysReq	**	
Alt '	-	-

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
Alt NumLock	**	**
Alt Scrolllock	**	**
Alt -	82	00
Alt Home	-	-
Alt ↑	-	-
Alt PgUp	-	-
Alt -	-	-
Alt F1	68	00
Alt F2	69	00
Alt F3	6A	00
Alt F4	6B	00
Alt F5	6C	00
Alt F6	6D	00
Alt F7	6E	00
Alt F8	6F	00
Alt F9	70	00
Alt F10	71	00
AA =	83	00
Alt ←	-	-
Alt [blank key]	-	-
Alt →	-	-
Alt +	-	-
Alt Esc	-	-
Alt 1	78	00

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
Alt 2	79	00
Alt 3	7A	00
Alt 4	7B	00
Alt 5	7C	00
Alt 6	7D	00
Alt 7	7E	00
Alt 8	7F	00
Alt 9	80	00
Alt 0	81	00
Alt End	-	-
Alt ↓	-	-
Alt PgDn	-	-
Alt ← (bksp)	-	-
Alt Tab	-	-
Alt Q	10	00
Alt W	11	11
Alt E	12	00
Alt R	13	00
Alt T	14	00
Alt Y	15	00
Alt U	16	00
Alt I	17	00
Alt O	18	00
Alt P	19	00

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
Alt [-	-
Alt]	-	-
Alt Enter	-	-
Alt Ctrl	**	**
Alt A	1E	00
Alt S	1F	00
Alt D	20	00
Alt F	21	00
Alt G	22	00
Alt H	23	00
Alt J	24	00
Alt K	25	00
Alt L	26	00
Alt ;	-	-
Alt '	-	-
Alt Shift (left)	**	**
A l t Z	2C	**
At X	2D	**
Alt C	2E	**
Alt V	2F	**
Alt B	30	**
Alt N	31	**
Alt M	32	**
Alt ,	-	—

** No codes

- Ignored

Keystroke	Scan Code	ASCII Code
Alt .	-	-
Alt/	-	-
Alt Shift (right)	**	**
Alt	**	**
Alt*	-	-
Alt\	-	-
Alt [space bar]	39	20
Alt CapsLock	**	**
Alt Ins	-	-
Alt Del	-	-

** No codes

- Ignored